Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A sensor comprising:

first, second and third ferromagnetic layers that are interleaved with first and second nonferromagnetic layers, said first nonferromagnetic layer residing between said first and second ferromagnetic layers, said second nonferromagnetic layer residing between said second and third ferromagnetic layers, said first and third ferromagnetic layers having magnetic moments with directions that are fixed in response to an applied magnetic field, said second ferromagnetic layer having a free portion and a fixed portion, said free portion having a magnetic moment with a direction that rotates in response to said applied magnetic field and said fixed portion having a magnetic moment with a direction that does not rotate in response to said applied magnetic field; and

first and second antiferromagnetic layers having different blocking temperatures, said first antiferromagnetic layer adjoining said first ferromagnetic layer and said second antiferromagnetic layer adjoining said third ferromagnetic layer, said second antiferromagnetic layer having a low blocking temperature and said first antiferromagnetic layer having a high blocking temperature;

wherein said third ferromagnetic layer overlaps said fixed portion and does not overlap said free portion.

2. (Canceled).

3. (Original) The sensor of claim 1, wherein at least one of said first and second nonferromagnetic layers is electrically conductive.

4. (Canceled)

5. (Canceled)

6. (Previously Presented) The sensor of claim 1, further comprising a fourth ferromagnetic layer and a third nonferromagnetic layer, wherein said third nonferromagnetic layer adjoins said first and fourth ferromagnetic layers.

7. (Canceled)

8. (Original) The sensor of claim 1, wherein at least one of said first and second nonferromagnetic layers includes ruthenium, iridium or rhodium.

9. (Original) The sensor of claim 1, further comprising a fourth ferromagnetic layer adjoining said second nonferromagnetic layer and separated from said third ferromagnetic layer.

10. (Original) The sensor of claim 1, wherein said direction of said magnetic moments of said first and third ferromagnetic layers are substantially perpendicular.

11. (Previously Presented) A sensor comprising:

a ferromagnetic pinned layer and a ferromagnetic free layer that are separated by an electrically conductive spacer layer,

a pinning structure adjoining said pinned layer and adapted to fix a magnetic moment of said pinned layer in a first direction,

a bias structure adjoining said free layer and adapted to stabilize magnetic domains of said free layer in a second direction, said bias structure including a ferromagnetic bias layer exchange coupled to a portion of said free layer by a nonferromagnetic layer; and

wherein said pinning structure includes a first antiferromagnetic layer and said bias structure includes a second antiferromagnetic layer, said first antiferromagnetic layer having a different blocking temperature than said second antiferromagnetic layer, said second antiferromagnetic layer having a low blocking temperature and said first and antiferromagnetic layer having a high blocking temperature.

12. (Canceled)

13. (Canceled)

14. (Original) The sensor of claim 11, wherein said free layer has a magnetically stabilized portion adjacent to said bias layer.

15. (Original) The sensor of claim 11 wherein said nonferromagnetic layer includes ruthenium, iridium or rhodium.

16. (Original) The sensor of claim 11, wherein said directions of said magnetic moments of said first and third ferromagnetic layers are substantially perpendicular.

17. (Currently Amended) A sensor comprising:

first and second ferromagnetic layers that are disposed substantially in a plane,

a third ferromagnetic layer that is not disposed in said plane, said third ferromagnetic layer having a first portion disposed proximate to said first ferromagnetic layer, a second portion disposed proximate to said second ferromagnetic layer and a third portion disposed between said first and second portions and distal to said first and second ferromagnetic layers,

a nonferromagnetic, electrically conductive layer adjoining said third ferromagnetic layer distal to said first and second ferromagnetic layers, and

a fourth ferromagnetic layer adjoining said conductive layer,

at least a first antiferromagnetic layer adjoining said first and second ferromagnetic layers; and

a second antiferromagnetic layer adjoining said fourth ferromagnetic layer, said first antiferromagnetic layer having a different blocking temperature than said second

antiferromagnetic layer, said first antiferromagnetic layer having a low blocking temperature and said second antiferromagnetic layer having a high blocking temperature;

wherein said fourth ferromagnetic layer has a magnetic moment that is fixed in the presence of an applied magnetic field, said first and second portions of said third ferromagnetic layer have magnetic moments that are fixed in the presence of said applied magnetic field and said third portion of said third ferromagnetic layer has a magnetic moment that varies in response to said applied magnetic field.

18. (Original) The sensor of claim 17, further comprising first and second nonferromagnetic, electrically conductive exchange coupling layers adjoining said first and second ferromagnetic layers and said third ferromagnetic layer.

19. (Original) The sensor of claim 18, wherein said exchange coupling layers include ruthenium, iridium or rhodium.

20. (Canceled)